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ABSTRACT

This manual contains a work sample intended to assess a handicapped student's interest in and potential to pass successfully a training program in automotive mechanics or in a similar automotive job. Section 1 describes the assessment, correlates the work performed and worker traits required for completing the work sample, and lists related occupations and DOT codes. Instructions to the evaluator are provided in the next section. The conditions and administration equipment are detailed, and the set-up and breakdown procedures are illustrated. Section 3, on administration, provides a student orientation including student material with an explanation and illustration of equipment and/or procedures. This section also contains instructions for task procedures actions to be taken, as well as post sample interview topics. Section 4 explains the method of scoring and provides forms. Section 5 lists technical data (norms, reliability, validity) to be included in a supplement to this manual. Contents of the section on maintenance and construction include information on tool and equipment maintenance, a materials list (equipment, source, price), work sample diagrams and/or photographs, and assembly instructions. Section 7 cites references. An appendix defines terms. (YLB)

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AUTOMOTIVE

Work Sample

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TABLE OF CONTENTS

SECTION HEADING	PAGE
I. INTRODUCTION	1
A. Assessment Description	1
B. Related Occupations	6
II. INSTRUCTIONS TO THE EVALUATOR	7
A. Work Sample Conditions	8
B. Administration Equipment	8
C. Set up and Breakdown	9
III. ADMINISTRATION	12
A. Student Orientation	12
B. Instruction and Demonstration	13
IV. SCORING	16
A. Explanations	16
B. Forms	16
TASK OBSERVATION RECORD	17
V. TECHNICAL DATA	20
VI. MAINTENANCE AND CONSTRUCTION	21
A. Maintenance	21
B. Materials List	22
C. Diagrams and/or Photographs	23
D. Assembly Instruction	25
VII. REFERENCES	26
APPENDIX	27

I. INTRODUCTION

A. Assessment Description

The Automotive Mechanic Assistant Work Sample II is intended to assess a student's interest in, and potential to successfully pass a Training Program in AUTOMOTIVE MECHANICS (DOT 620.684-014), or in a similar automotive job.

The Automotive Mechanic Assistant Work Sample II falls within the Mechanics and Machinery Repair Occupational Group Arrangement and Elemental Work: Mechanical-Worker Trait Group, to which the Work Sample is related.

The work performed and Worker Traits required for completing the Automotive Mechanic Assistant Work Sample are as follows:

WORK PERFORMED	WORKER TRAITS REQUIRED	
1. Takes oil drain pan and places it under oil filter.	GED	1
	SVP	1
	APT	G-3, K-4, M-3, E-4
	WS	7
	PD	L, 1, 3, 4, 6
	WC	1(1)
	WA	1
2. Places Mechanic's Creeper down next to Work Sample.	GED	1
	SVP	1
	APT	G-3, K-4, M-3, E-4
	WS	7
	PD	L, 1, 3, 4, 6
	WC	1(1)
	WA	1
3. Takes the oil filter wrench and cloth in hand, from tool bench	GED	3
	SVP	1
	APT	G-3, K-4, M-3, E-4,
	WS	7
	PD	S, 1, 4
	WC	1(I)
	WA	1
4. Faces upward and lays down on Mechanic's Creeper	GED	1
	SVP	1
	APT	G-3, K-4, M-3, E-4
	WS	7
	PD	L, 1, 2, 3, 4, 6
	WC	1
	WA	1

5. Holds oil filter wrench, maneuvers on the creeper to move under work sample and locates oil filter.	GED	3
	SVP	1
	APT	G-3, K-4, M-3, E-4
	WS	7
	PD	L, 1, 3, 4, 6
	WC	1(I)
	WA	1
6. Places wrench over filter and turns it in a counter-clock-wise position	GED	3
	SVP	1
	APT	G-3, K-4, F-4, M-3, E-4
	WS	8
	PD	L, 1, 3, 4, 6
	WC	1(I)
	WA	1
7. Unscrews the oil filter by hand	GED	1
	SVP	1
	APT	G-3, K-4, F-4, M-3
	WS	7
	PD	L, 1, 3, 4, 6
	WC	1(I)
	WA	1
8. Places oil filter down into drain pan.	GED	1
	SVP	1
	APT	G-3, K-4, M-3, E-4
	WS	7
	PD	L, 1, 3, 4, 6
	WC	1(I)
	WA	1
9. Wipes excess oil off the oil filter flange	GED	1
	SVP	1
	APT	G-3, K-4, M-4, E-4
	WS	7
	PD	S, 4
	WC	1(I)
	WA	1

10. Manuevers body away from under the work sample	GED	1
	SVP	1
	APT	G-3, K-4, M-3, E-4,
	WS	7
	PD	L, 1, 3, 4, 6
	WC	1(I)
	WA	1
11. Holds oil filter and lubricates oil filter seal.	GED	1
	SVP	1
	APT	G-3, K-4, M-3, F-3
	WS	7
	PD	L, 1, 4, 6
	WC	1(I)
	WA	1
12. Positions body on Mechanic's Creeper and moves beneath the Work Sample.	GED	1
	SVP	1
	APT	G-3, K-4, F-3, M-3
	WS	7
	PD	L, 1, 3, 4, 6
	WC	1(I)
	WA	1
13. Screws oil filter on to oil filter flange	GED	3
	SVP	1
	APT	G-3, K-3, F-4, M-3
	PD	L, 1, 3, 4
	WC	1(I)
	WA	1
	WS	7, 8

14. Hand-tightens the oil filter	GED	1
	SVP	1
	APT	G-3, F-4, M-3,
	WS	7
	PD	L, 4
	WC	1(I)
	WA	1
15. Tightens filter with oil filter wrench.	GED	1
	SVP	1
	APT	G-3, K-4, M-3
	WS	8
	PD	L, 1, 4
	WC	1(I)
	WA	1
16. Maneuvers from under the Work Sample.	GED	1
	SVP	1
	APT	G-3, K-4, M-3, E-4
	WS	7
	PD	L, 1, 3, 4, 6
	WC	1(I)
	WA	1

B. *Related Occupations*

Automotive Mechanic Assistant Work Sample II DOT description:

AUTOMOTIVE MECHANIC ASSISTANT (620.684-014)

Related Occupations	*DOT Code*
TRACTOR MECHANIC HELPER	620.684-030
BRAKE ADJUSTER	620.684-018
AUTOMOBILE WRECKER	620.684-010
BRAKE DRUM LATHE OPERATOR	620.682-010
MAINTENANCE MECHANIC HELPER	620.664-014
CONSTRUCTION EQUIPMENT-MECHANIC HELPER	620.664-010

II. INSTRUCTIONS TO THE EVALUATOR

A. Work Sample Conditions

The Automotive Mechanic Assistant Work Sample II is to be administered indoors or outdoors with good overhead lighting and moderate noise level from neighboring work areas. The Sample involves physical demands such as standing, stooping, crouching, reaching, handling, fingering, feeling and seeing. It must be done by a two-armed person, standing in front of the work sample. This sample was designed to simulate the functions and methods of an Automotive Mechanic Assistant.

The sample is not physically hazardous in any way, and requires no safety equipment, although all health and safety precautions should be adhered to regarding Occupational Safety and Health Act requirements as well as those safety factors which may be encountered in local industry and unique job requirements.

B. Administration Equipment

The following equipment is required prior to administration:

Evaluator Equipment:

- Stopwatch
- Manual for the Automobile Mechanic Assistant Work Sample II.
- Task Observation Sheet

Student Equipment:

- Work table
- Mechanics creeper
- New oil filter
- 8 oz. can of oil
- Simulated Work Sample engine compartment with oil filter to flange set-up.
- Oil drain pan (to place oil filter in when removed from flange)

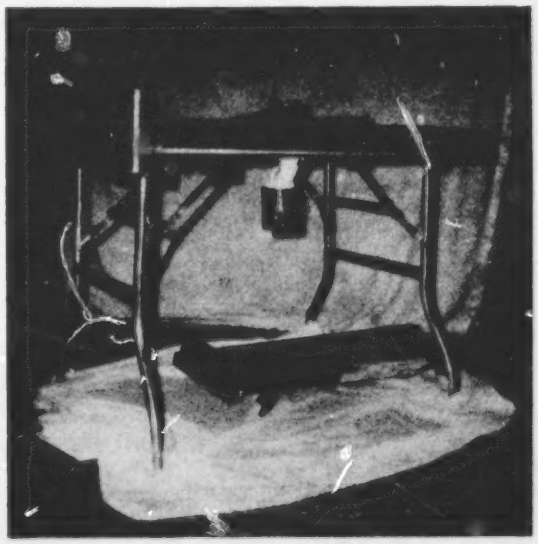
Note: Safety glasses are required on this Work Sample.

C. Set-up and Breakdown

An illustration of correct set-up and breakdown procedures for the Automotive Mechanic Assistant Work Sample II is shown in figures I, II, III. The Work Sample part is mounted below on simulated engine, as it would be on a live engine. The student stands facing the front or side of the work sample box.

FIGURE I (2 views)

Correct sample box illustrating oil filter flange set-up.



While giving instructions and pointing out work sample parts, the Evaluator stands to the right side of the work sample so as not to obstruct the student's view of the work sample.

FIGURE I - Tools and Equipment needed for Work Sample

FIGURE II - Correct Work Sample breakdown

Timing Procedures:

The Work Sample is timed from the moment the student signifies that he/she understands the instructions and picks up the first tool or piece of equipment and indicates that he/she is ready to begin the removal phase, until the last tool or piece of equipment needed for the replacement phase is finished and then the student indicates completion.

Quality Checks:

Quality is checked by the Evaluator, once the student has completed the Work Sample and compares the work to Task Observation and Scoring Record.

III. ADMINISTRATION

A. Student Orientation

Read or paraphrase the following information to the student:

> The Work Sample that you are going to do is called the Automotive Mechanic Assistant Work Sample II.
>
> The work you will be doing on this work sample is some of the work that assistant auto mechanics do in the Automotive Services Industry.
>
> On this work sample, you will look over and inspect the oil filter mounted under the work sample engine and replace it with a new oil filter provided.
>
> The purpose of an oil filter is to screen or strain out any dirt or dust particles while the motor oil circulates through the engine lubricating system.
>
> Before you start the required work, understand and know how to manipulate the hand tool and equipment needed. After you have done this, you may begin oil filter removal.
>
> I'll show you how to do the work in a minute, but first, do you have any questions?

B. Instruction and Demonstrations (Part 1)

Sighted population

Safety glasses required

Evaluator oral instructions and illustrations will orient both student and evaluator for task procedures.

STATEMENT	ACTION
Your job is to remove the oil filter and replace it with a new filter provided.	Locate the oil filter (illustration) Point to new filter.
Place oil drain pan under the work sample, below oil filter flange.	Point to drain pan. Evaluator-demonstration.
Take mechanic's creeper and place it down next to the work sample.	Point to mechanic's creeper. Evaluator-demonstration.
Take the oil filter wrench and cloth provided, both in hand, which are on the tool bench.	Evaluator-demonstration. Point to cloth and wrench.
With oil filter wrench in hand, maneuver yourself on the creeper and move under the work sample and locate oil filter.	Same as above.
Place wrench over grooved portion of oil filter canister (off-leverage position) and turn counter-clockwise to remove the filter. (The word "off" is facing you, turn in direction of marked arrow. The wrench will grip or compress against the grooved portion of the filter).	Same as above.
Once the oil filter turns freely, remove the wrench and place it down on the floor or ground and unscrew the filter by hand. *Remember also to keep oil filter in upright or same position as if mounted, in order not to spill any oil that may be accumulated in the filter.	Evaluator-demonstrator.

B. Instruction and Demonstrations (Part 1 cont.)

STATEMENT	ACTION
When oil filter is removed from the work sample, place it into the drain pan.	Evaluator-demonstration
Wipe off any oil on the filter mounting flange with the cloth. (Seal surface and external threaded piece)	Same as above
At this time, maneuver yourself from under the work sample. When you have finished the removal phase, inform the evaluator that you are finished. Do you understand the instructions? Put your safety glasses on. Go ahead and begin.	Observe whether there are any questions and then allow to proceed.

Instruction and Demonstrations (Part 2)

Sighted Population.

You may have some time to become familiar with replacing the oil filter, after you have read the instructions.

Evaluator oral instructions and illustrations will orient both student and evaluator for task procedures.

STATEMENT	ACTION
Your job now is to replace the new oil filter.	Point to new oil filter.
Take the oil filter in hands and with fore-finger, lubricate the oil filter seal with a thin light coat of oil.	Point to the seal and oil. Evaluator demonstration.
With the Mechanics Creeper to the side of the work sample engine and with oil filter in hand, position yourself on the creeper and move beneath the work sample to mount the oil filter.	Evaluator demonstration or illustration.

B. Instruction and Demonstrations (Part 2 cont.)

STATEMENT	ACTION
Position oil filter to external threaded flange and slowly begin to screw the filter on to the flange clockwise. (filter should turn freely, if not, stop immediately, it may be cross-threaded on flange.	Same as above.
Oil filter should now be hand-tight on the flange.	Same as above.
Pick up and place the oil filter wrench over the oil filter canister (on leverage position) and tighten 1/2 turn clockwise for extra hand-tightness. The word "on" is facing you - turn in direction of marked arrow.	Same as above.
At this time, maneuver yourself from under the work sample. Put handtools and equipment back to their proper places.	Observe whether there are any questions, and then allow student to proceed.
When you have finished the REPLACEMENT PHASE, Inform the Evaluator that you are finished. Do you understand the instructions? Put on your safety glasses, go ahead and begin.	

After the assessment has been completed, please return all of the handtools and equipment to the work bench.

Post-sample Interview Topics:

1. Did you like or dislike the course tasks?
2. What do you think of automotive services now that you have completed the work sample?
3. Do you need more information about Automotive Mechanic Assistant training?

IV. SCORING

A. Explanations

1. Method of Scoring:

   The measure of Productivity will be assessed by comparing the time needed to complete all tasks, with student norms.

   Quality will be assessed by the total number of errors upon removal and replacement procedures of an oil filter.

2. Work Performance Factors to be Observed:

   Student able to follow verbal instructions

   Physical capacities needed to manipulate objects to complete the work sample.

   Neatness - Returning of handtools and equipment to proper places.

B. Forms

Task Observation Record

School_____

AUTOMOTIVE MECHANIC ASSISTANT WORK SAMPLE I

Task Observation Record

Critical Errors (5 points each)

_____1. Wrong location of oil filter and mounting flange.

_____2. Failure to use oil filter wrench correctly to remove old oil filter.

_____3. Cross-threads new oil filter on to filter flange.

_____4. Failure to install new oil filter.

_____5. Failure to tighten new oil filter as specified.

Observational explanations for 1 through 5

Task Quality Errors (3 points each)

_____ 6. Failure or neglect to use Mechanic's Creeper under work sample

_____ 7. Excessive oil spillage upon removal of old oil filter.

_____ 8. Failure to wipe off excess oil or dirt from filter flange.

_____ 9. Failure to lubricate seal ring on new oil filter.

_____ 10. Failure to return all equipment to proper place upon completion of the oil filter change

Observational explanations for 6 through 10

Put additional comments and observations below.

_____ Critical errors

_____ Task quality errors

_____ Min _____ Sec Total time

_____ Date taken

_____ Evaluator

_____ Student

V. TECHNICAL DATA

A supplement to this manual is being developed at the time of this printing. It will include:

1. Norms
2. Reliability, test-retest studies
3. Validity
   a. Content validity - established through the Course Analysis based on methods suggested by U. S. Dept. of Labor Job Analysis techniques.
   b. Predictive Validity
      To be established through follow-up studies of students previously tested.

VI. MAINTENANCE AND CONSTRUCTION

A. Maintenance

After each administration:

- Evaluator should see that all tools and equipment are in their proper places.
- Tools and equipment should be kept clean after each administration.
- Check tools and equipment for condition and wear (include safety glasses for condition and cleanliness).
- After each administration:
  - . Check the work sample
  - . Mounting flange threads
  - . Oil filters
  - . Oil seal ring for condition and wear

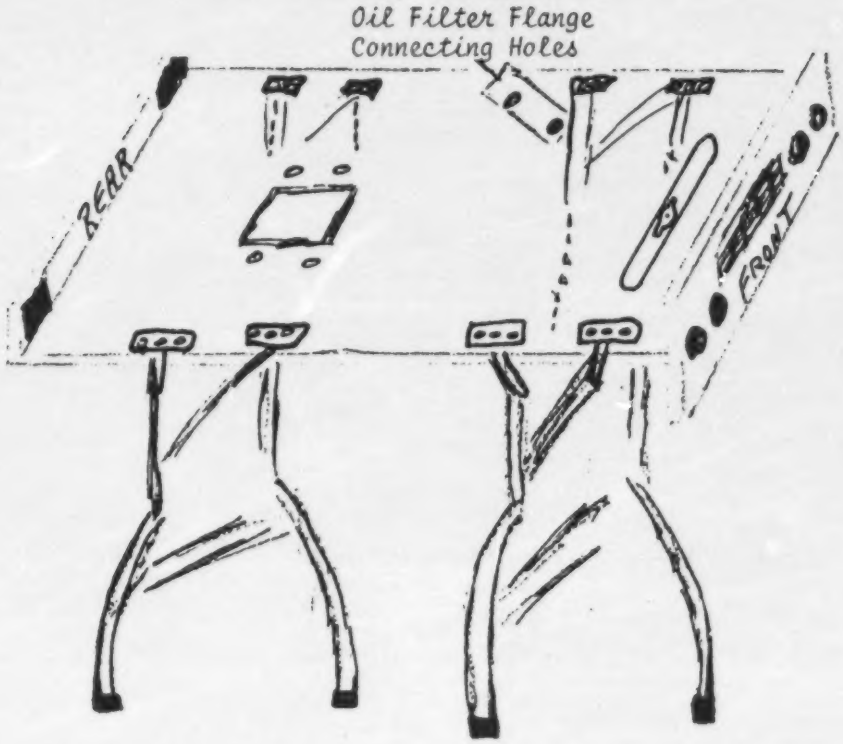
B. Materials List

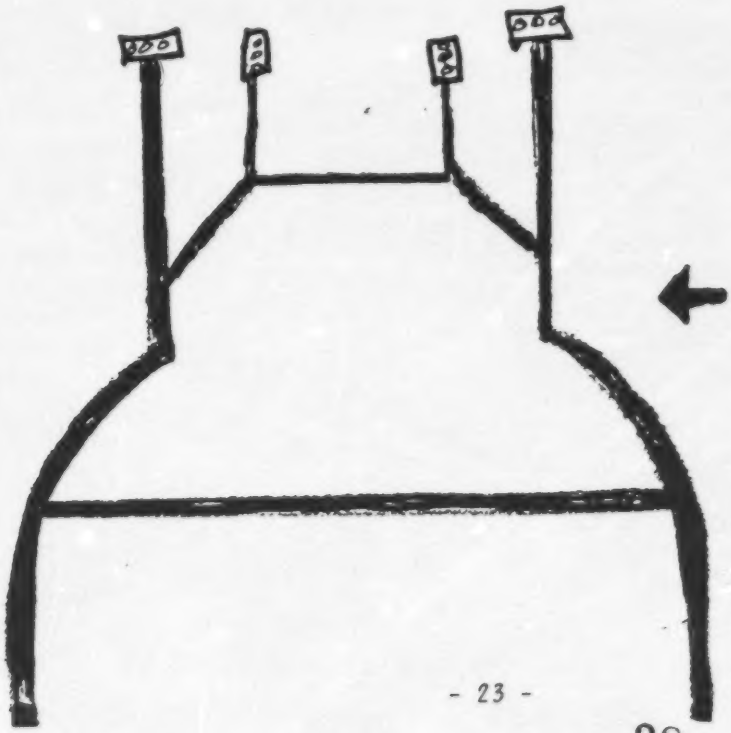
Equipment	Source	Price
Ford Co. oil filter mounting flange	Gibbs Ford (car dealership) Saugus, MA	$6.73
can also be a used part	Woburn Used Auto Parts	2-3.00
New oil filter	Eastern Auto Parts Co. Malden, MA	4.00
Used oil filter	Repair Shop or Gas Station	
Cleaning rags	Station offering lubrication services	No Charge
Oil drain pan	Eastern Auto Parts	2.99
Mechanics Creeper	Eastern Auto Parts	10.99
Oil filter wrench	Eastern Auto Parts	5.99
Safety Glasses	Sears W. Peabody, MA	3.99
8 oz. can of oil (3 in 1 household oil)	Sears	.88

Materials needed for Work Sample construction (engine compartment)

1/2" plywood - 4 X 8 (makes 3 work sample tops)	Commonwealth Lumber Malden, MA	16.00
1 set (2) wishbone type heavy duty folding legs	Beden Hardware Lynn, MA	40.00
	(Approximate total)	$94.59

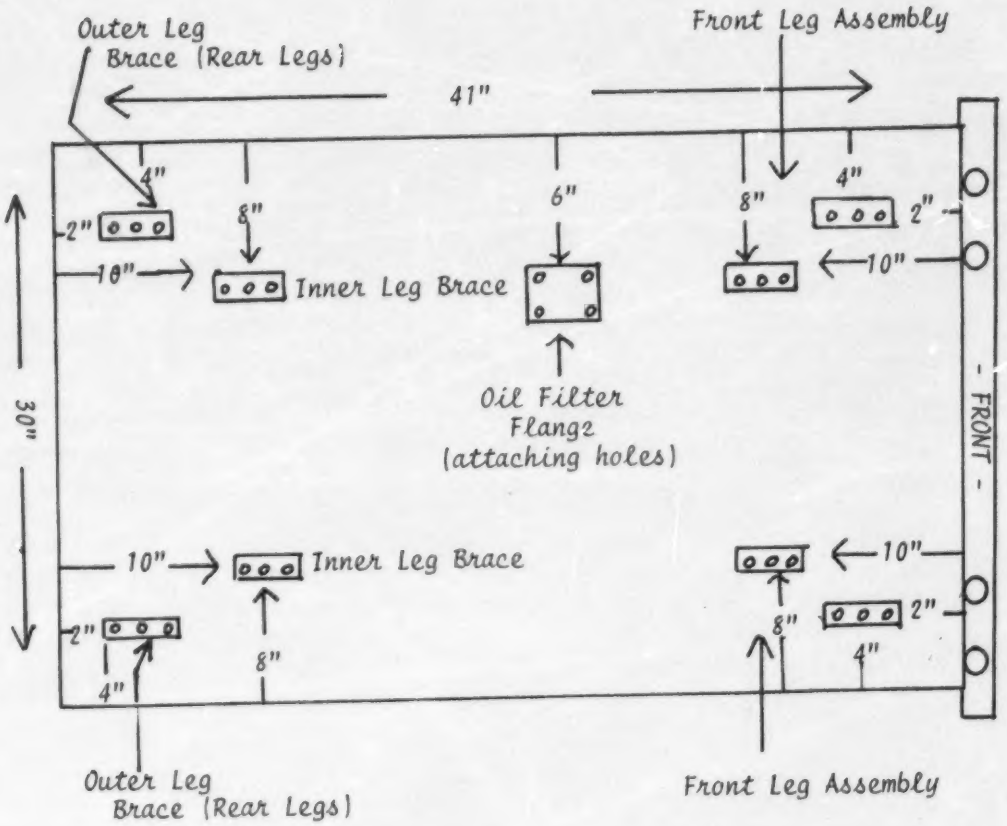
C. Work Sample Diagram





C. Work Sample Diagram (cont)

Dimensions for leg brace assemblies and oil filter flange assembly hole



D. Assembly Instructions

The Work Sample parts are numbered for their identification:

1. Horizontal Top Work Sample (30" X 41")
2. Front Folding Leg Assembly } Each leg has been cut down 1" for
3. Rear Folding Leg Assembly } correct vehicle specification)

The top Work Sample board (No.1) is positioned on its side in order to extend or open the folding legs.

The Front and Rear Folding Leg Assemblies are permanently attached and secured to the bottom of the Work Sample Board.

Position the Work Sample upright (top piece is horizontal)

Work Sample Components:

4. White Metal Oil Filter Flange
5. Used Oil Filter (drained)

Locate the marked oil filter flange holes on the top work sample board.

In order to connect the oil filter flange assembly properly, line up the corresponding letters on the flange to the letters on the sample board marked No. 4 - oil filter flange.

Remove the two outer washers and two wing nuts from the flange and insert the two bolts under the top work sample board, according to the letters.

Place the used oil filter (no. 5) on to the oil filter flange and screw on clockwise, hand tight and then approximately a 1/2 turn more with the oil filter wrench for correct tightness.

CHECK ALL HAND ASSEMBLIES FOR SECURENESS AND SUPPORT!

VII. REFERENCES

Korn, T. (ed.) A Work Sample Style Manual. Interface No. 10. Menomonic, WI.: Research and Training Center, University of Wisconsin - Stout, 1976.

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Occupational Outlook Handbook, 1970-71 Edition. Washington, D.C.: United States Government Printing Office, 1970.

APPENDIX

Definition of Terms

GED - Is the general level of learning and reasoning acquired through schools, experience and self study. There are six GED difficulty levels, ranging from (6) the most difficult to (1) the simplest.

SVP - Is the special vocational preparation and training in terms of the total time required to prepare for an occupation. It ranges from SVP 1, short demonstrations only, to SVP 9, over ten years.

APT - Refers to aptitudes, which is the quickness and ease with which you can learn to do something. Aptitude definitions are included on a separate page in this manual.

WA - Work Activities:

1. Dealing with things and objects.
2. Involving business contacts.
3. Of a routine, definite, organized nature.
4. Involving direct personal contact to help or instruct others.
5. Resulting in recognition or appreciation from others.
6. Involving the communication of ideas and information.
7. Of a scientific and technical nature.
8. Involving creative thing.
9. Involving processes, methods or machines.
10. Involving working on or producing things.

WS - Work situations are the conditions under which the work involved in any occupation takes place. There are ten types described and they have been related to the 66 Worker Trait Groups in the Guide for Occupational Exploration. They are:

1. Performing duties which change frequently.
2. Performing duties of a routine nature.
3. Planning and directing an entire activity.
4. Dealing with people.
5. Influencing peoples opinions, attitudes, and judgements.
6. Working under pressure.
7. Making decisions using personal judgement.
8. Making decisions using standards that can be measured or checked.
9. Interpreting and expressing feelings, ideas, or facts.
10. Working within precise limits or standards.

PD - Physical Demands are the physical requirements of an occupation and are described in six areas as follows:

1. Lifting, carrying, pushing and/or pulling.
2. Climbing and/or balancing.
3. Stooping, kneeling, crouching, and/or crawling.
4. Reaching, handling, fingering, and/or feeling.
5. Talking and/or hearing.
6. Seeing.

WC - Working Conditions are the physical surroundings of a worker in a job. The DOL lists six different types as follows:

1. Inside or outside.
2. Extremes of cold plus temperature changes.
3. Extremes of heat plus temperature changes.
4. Wet and humid.
5. Noise and vibrations.
6. Hazards.

Aptitudes are rated on a scale of 1 - Highest to 5 - Lowest as follows:

1 - Top 10% of the population
2 - Top third not including the top 10%
3 - Middle third of the population
4 - Lowest third not including lowest 10%
5 - Lowest 10%

The following are the definitions of the aptitudes:

G - General Learning Ability - The ability to "catch on" or understand instructions and underlying principles; the ability to reason and make judgements Closely related to doing well in school.

V - Verbal Aptitude - The ability to understand meaning of words, and to use them effectively. The ability to comprehend language, to understand relationships between words and to understand meaning of whole sentences and paragraphs.

N - Numerical Aptitude - Ability to perform arithmetic operations quickly and accurately.

S - Spatial Aptitude - Ability to think visually of geometric forms and to comprehend the two-dimensional representation of three-dimensional objects. The ability to recognize the relationships resulting from the movement of objects in space.

P - Form Perception - Ability to perceive pertinent detail in objects or in pictorial or graphic materials. Ability to make visual comparisons and discriminations and see slight differences in shapes and shadings of figures and widths and lengths of lines.

Q - Clerical Perception - Ability to perceive pertinent detail in verbal or tabular material. Ability to observe differences in copy, to proofread words and numbers, and to avoid perceptual errors in arithmetic computation. A measure of speed of perception which is required in many industrial jobs even when the job does not have verbal or numerical content.

K - Motor Coordination - Ability to coordinate eyes and hands or fingers rapidly and accurately in making precise movements with speed. Ability to make a movement response accurately and swiftly.

F - Finger Dexterity - Ability to move the fingers, and manipulate small objects with the fingers, rapidly and accurately.

M - Manual Dexterity - Ability to move the hands easily and skillfully. Ability to work with the hands in placing and turning motions.

MR - Mechanical Reasoning - The ability to understand mechanical principles (pulleys, gears, etc)

E - Eye-Hand-Foot Coordination - Moving the hands and feet together in response to visual signals or observations.

C - Color Discrimination - Seeing likenesses or differences in colors or shades. Identifying or matching certain colors. Selecting colors which go well together.